StorageUtsira

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Risø DTU

Kick-Off Meeting, 10 February 2009
IFE, Kjeller, Lillestrøm, Norway

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Risø DTU

- Risø National Laboratory founded 1958 for nuclear research
- Diversified into a broader range of energy technologies, in particular wind
- 2007 merger with Technical University of Denmark – DTU, as
- National Laboratory for Sustainable Energy

- Systems Analysis Department
- Research programme Energy Systems Analysis

ETSAP: Modelling and analyses involving Denmark

- 1981: Danish Energy Agency – MARKAL implementation
- 1995: Benefits from Electricity Trade in Northern Europe under CO_2 Constraints.
- 1998: A MARKAL model for Denmark,, IFE Norway
- 1999: Nordleden 1st Phase. Cross-border grid-distributed energy trade and common action among the Nordic countries to facilitate CO_2 reductions – using MARKAL-NORDIC
- 2003: Nordleden 2nd Phase.
- 2004: NEEDS, New Energy Externalities Developments for Sustainability, Research Stream 2a: “Energy systems modelling and internalisation strategies, including scenarios building” (EU 6th Framework).
- 2005: Energy Research Programme 2005. Participation in ETSAP Annex X
- 2006: RES 2020 (Intelligent Energy Europe).
- 2007 National model harmonosed with NEEDS og RES2020 Pan European Model

Risø projekter vedr. TIMES

- NEEDS
  New Energy Externalities Developments for Sustainability, Research Stream 2a: “Energy systems modelling and internalisation strategies, including scenarios building”.
  EU 6th Framework Programme
- ETSAP
  Danish participation in IEA-ETSAP, Annex X, 2005-2007
  EFP 2005. Energi og Samfund
- RES 2020
  Monitoring and Evaluation of the RES directives: implementation in EU27 and policy recommendations for 2020
  Intelligent Energy – Europe (IEE)
- EFDA
  EFDA-TIMES Model: Upstream Sector Update:
  Sub Task : Experince curves and vintaging in EFDA-TIMES.
  European Fusion Development Agreement (EFDA)

Candidate energy models for assessment of CCS in Denmark

- RAMSES: Detailed model with the Danish Energy Authority for electricity and heat. Exogenous investment in new capacity.
- Balmorel: Optimisation model for electricity and heat in the Baltic Sea countries. CCS is not considered. Many studies since 1999.
- NEEDS-TIMES Pan-European model. First model results presented on the NEEDS project meeting Amsterdam 24 October 2007. Much emphasis on CCS technologies.
  - Removal by Enhanced Oil Recovery
  - Removal by Depleted oil and gas fields (onshore and offshore)
  - Removal by Enhanced Coalbed Methane recovery > and <1000 m
  - Removal by Deep saline aquifers
  - Mineralization for CO2 storage
  - Removal by Afforestation – specific for demand sectors
- Extract of NEEDS-TIMES focusing on wind power in Denmark and its complements

CCS in Danish energy strategy and energy research

Publication: A visionary Danish energy policy 2025, January 2007

- “Trials are at present being made on storing CO2. If technological development indicates that this can be done cost effectively and without harm to the environment, the consequences for energy policy must be examined in greater detail. Naturally, this still lies some years in the future.”

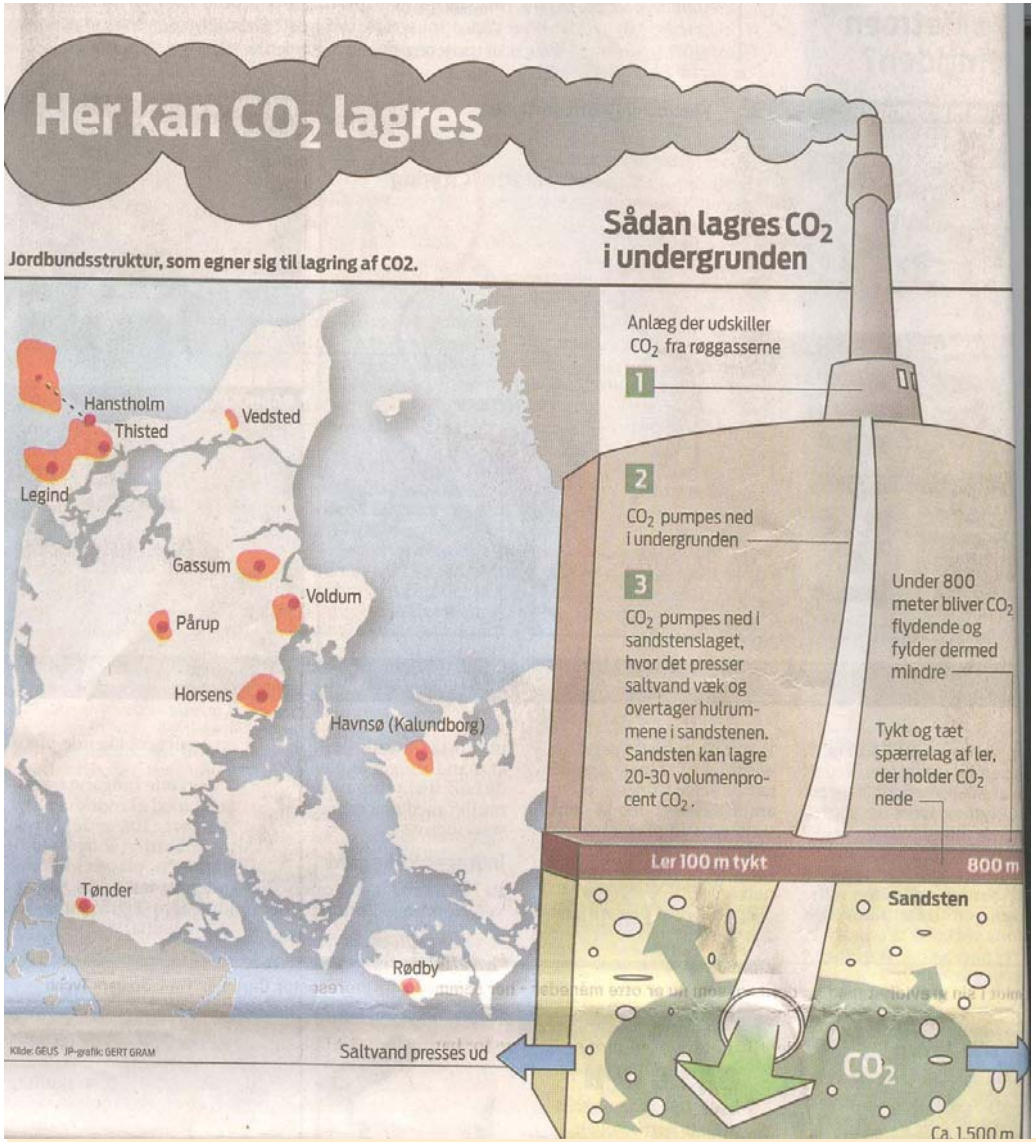
Report on the new energy research programme,2007:

- “The European Technology Platform for Zero Emission Fossil Fuel Power Plants (ZEP) states in its Strategic Research Agenda (SRA) that CO2 emissions from electricity production can be lowered by 60% by 2050 through the development of carbon capture and storage technologies and that these CCS technologies will be commercially available in 2020.”

DONG Energy participates in CASTOR

- A pilot unit capable of treating from 1 to 2 tons of CO2 per hour

Status of CCS development in Denmark (November 2007)



- The potentials for CCS in Denmark is becoming increasingly constrained
- Very little interest by Danish energy experts and the general public in many years
- Participation in the EU CASTOR project
- Pilot plant at modern coal-fired plant in Esbjerg, Denmark near the North Sea oil and gas fields
- CCS is not considered in forecasts of greenhouse gasses by official forecasts to 2030
- The technical potential for CCS is described in the newspaper Jyllands Posten, 21 October 2007

GeoCapacity

- Assessing European capacity for geological storage of carbon dioxide – the EU GeoCapacity project

- Exchange of data with GEUS - Geological Survey of Denmark and Greenland is required in the contract with the Danish research programme for finansing this project

GeoCapacity

- EU 6th Framework Programme
- Co-ordinated by GEUS - Geological Survey of Denmark and Greenland
- 25 partners
- Database on CO2 storage sites
- Assessment of CO2 storage capacity in most European countries